CHAPTER V AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Chapter V

Affected Environment and Environmental Consequences

INTRODUCTION

This chapter describes the existing physical and biological resources and environmental factors in the study area (affected environment) and the effects of the alternatives on certain resources and environmental factors (environmental consequences). Resources include soils, groundwater, vegetation, wildlife, special status species, recreation and visual resources, cultural resources, Indian sacred sites, and Indian trust assets. Environmental factors include climate, air quality, noise, topography, geology, land use, transportation, economics, and environmental justice. All resources and factors within the study area are described in the affected environment section; however, only those resources and factors that could be affected by the alternatives are analyzed in the environmental consequences section.

The No Action Alternative, which provides the basis of comparison for the effects of the three action alternatives, describes conditions in the future if no action were implemented.

The analysis of the potential effects of the alternatives on resources is based on the professional judgment and experience of Bureau of Reclamation (Reclamation) staff specialists, their discussions with other experts and professionals, literature review, and field trips to the study area. The depth of the analyses corresponds to the scope and magnitude of the potential effects of the alternatives. If an alternative could adversely affect a resource, appropriate mitigation measures are presented.

The goal of this chapter is to quantify, to the extent possible, the effects of each alternative on the resources and environmental factors. However, if quantitative estimates were not possible, qualitative estimates are provided.

CLIMATE

The study area is within the Yuma Desert, a sub-region of the Sonoran Desert, which is one of the hottest, driest regions on the North American continent. **Photograph V-1** shows a typical landscape.

Photograph V-1.—Typical landscape within 5-mile zone area.

According to National Weather Service records, temperatures average at least 100 degrees Fahrenheit (°F) from June 4 to September 24. The warm temperatures ensure a year-round growing season, with an average of 348 frost-free days a year.

The area receives an average of 2.77 inches of precipitation a year and averages only 17 rainy days a year. Consequently, the area has no reliable source of surface water other than the Colorado River.

Average wind speeds are less than 8 miles per hour, although the Federal Aviation Administration cautions pilots in the area to be aware of blowing sand. Predominant winds are from the south during the summer (June through mid-September) and from the north during the winter (November through February).

Because of the hot climate, the U.S. Border Patrol (Border Patrol) stationed in Yuma, Arizona, often works at night during the spring, summer, and fall months, rescuing or pursuing possible illegal immigrants in off-highway vehicles (OHV) rather than on foot. This use of OHVs has resulted in a maze of two-track trails throughout the 5-mile zone.

AIR QUALITY

Affected Environment

To assess air quality in the study area, Reclamation reviewed two recent environmental assessments and one project study with information about the area=s air quality. The environmental assessments addressed the commercial port-of-entry and the proposed State Route 195 (SR195) projects. The project study was an environmental evaluation associated with the development of a master plan for the proposed expansion of the local airport, Rolle Airfield.

Review of these studies and a search of the Arizona Department of Environmental Quality (ADEQ) website (www.adeq.state.az.us) documents that portions of the 5-mile zone are within the Yuma PM_{10} Non-Attainment Area. (PM_{10} is defined as particulate matter with an aerodynamic diameter of less than or equal to 10 micrometers. The purpose of the PM_{10} standard is to protect human health from particulate matter that is respirable and, thus, detrimental to lung tissue.) The Environmental Protection Agency (EPA) designates areas with air quality that does not meet standards as "non-attainment areas." The Yuma Metropolitan Planning Organization Air Quality Conformity Analysis states that the southern boundary of the Yuma PM_{10} non-attainment area is County 22nd Street; therefore, most of the study area is outside the non-attainment area. (See **map 1-2**.) Once an area has been designated as a non-attainment area, a State Implementation Plan (SIP) must be developed. The SIP is a document that demonstrates to the EPA measures that will be taken to reduce the pollutant levels to meet air quality standards. The original Yuma PM_{10} SIP was completed and submitted to the EPA in November 1991. It was revised in July 1994 and currently is awaiting EPA review and approval. However, it has been deemed adequate to meet or exceed the requirements for completion of such plans.

Natural and manmade activities, such as operating a vehicle on unpaved roads, agricultural tilling, open burning, pollination, and wind blown dust emit particulates. The Yuma PM_{10} SIP indicates that the two main sources of particulate pollution within the study area are agricultural tilling and unpaved roads, which account for nearly 75 percent of the total regional PM_{10} emissions. Most of the remaining 25 percent of particulate pollution comes from agricultural burning, windblown agricultural lands, and unpaved parking areas.

According to ADEQ, Yuma County last exceeded the 24-hour standard for PM_{10} in 1991, with a particulate level of 229 micrograms per cubic meter, and last violated the annual arithmetic mean in 1990, with a particulate level of 57 micrograms per cubic meter. According to recent ambient monitoring data, the Yuma area has met the 24-hour and annual PM_{10} standards for the past several years. Yuma County and associated areas within the study area have not exceeded air quality standards for other pollutants identified and monitored by ADEQ and EPA, including ozone, carbon monoxide, sulfur dioxide, and lead.

Preparers of the Rolle Airfield airport master plan contacted the ADEQ, Office of Air Quality, to determine the potential effects of proposed airport development on air quality. ADEQ verified that the airfield is within the Yuma air quality non-attainment area. Regarding airport development, ADEQ stated,

> "Air quality permits may be required during construction. Design review of all improvements should focus on application of Best Management Practices to reduce particulates. Extra paving, gravel mulches, and vegetation are examples of Best Management Practices that could be employed to minimize air quality problems attributable to the facility."

ADEQ=s response would apply to any development or ground-disturbing activity conducted within the study area and reflects air pollution reduction measures identified in the Yuma PM_{10} SIP.

Environmental Consequences

Alternative A

Existing air quality and potential effects on air quality would continue under Alternative A.

Alternative B

Alternative B would provide the maximum benefits to air quality within the study area among all the alternatives, primarily because it allows less land clearing and emphasizes closing and rehabilitating un-needed roads and OHV roads/trails. Currently, dust caused by vehicles on dirt roads and blowing dust on cleared lands are some of the most common causes of airborne particulate pollution in the study area. Also, limited public use and access (compared to the other alternatives) throughout the study would result in less air quality degradation from vehicle emissions. In addition, less commercial development would mean fewer diesel truck emissions and industrial airborne pollutants.

Alternative C

Alternative C would result in the greatest potential adverse effects of air quality among all the alternatives. Maximizing recreation, community, and commercial development within the study area would result in more unsurfaced roads and parking areas, cleared land (and, thus, more vehicle-caused dust and blowing dust), and vehicle and industrial airborne emissions than under Alternatives B and D.

Alternative D

Alternative D would provide for less construction of unsurfaced roads for recreational access and community and commercial development than Alternative C but more than for Alternative B. Therefore, vehicle-caused dust, blowing dust, and vehicle and industrial airborne emissions would be greater than under Alternative C but less than under Alternative B.

Cumulative Impacts

The increase in public use and vehicle emissions and airborne dust within the study area, as well as the surrounding area, could have a cumulative adverse effect on air quality. However, the construction of new roads could decrease possible PM_{10} emissions and improve air quality in the area.

Mitigation

Paving or surfacing primary and secondary roads and parking areas to prevent dust will help reduce airborne particulates throughout the study area. Additionally, requiring dust abatement measures during construction activities and revegetating disturbed areas, including areas disturbed by OHV use, will reduce airborne particulates.

Residual Impacts

No residual impacts have been identified.

NOISE

Affected Environment

Most areas within the study area are rural and undeveloped, interspersed with several relatively isolated land uses and agricultural groves. Land uses generally found within or adjacent to the study area, such as agricultural tilling and sludge disposal, generate relatively low levels of noise. The wells and pumping substations within the study area are also generally quiet and generate low levels of noise while in operation. Vehicular traffic along 23rd Street creates a moderate level of noise audible near the highway. Mexican Federal Highway 2, located along the international boundary, generates low levels of noise audible within portions of the study area. Agricultural operations within and adjacent to the study area create seasonal noise from agricultural equipment and truck operations.

The recent Rolle Airfield airport master plan described the effect of a proposed expansion of airfield operations on the surrounding area. The plan concluded that even by the year 2020, the anticipated noise level should not unduly affect any existing or proposed land uses surrounding the airfield.

The Yuma Auxiliary Field-2 Air Installation is used by the military for aircraft and vehicle operations. The Marine Corps Air Station (MCAS) and Yuma County jointly administer the Auxiliary Field Air Installation Compatible Use Zone that affects the northeast most portion of the study area. The military operations affect landowners adjacent to the air field because of explosions, vibrations, and high energy and electronic emitters. They have jointly issued regulations dealing with noise exposure and associated development standards.

The Arizona Department of Transportation (ADOT) conducted a study of the noise environment adjacent to the proposed SR195, in accordance with Title 23 Code of Federal Regulations (CFR), Part 772, U.S. Department of Transportation, FHWA Procedures for Abatement of Highway Traffic Noise and Construction Noise, and the 2000 Arizona Department of Transportation Noise Abatement Policy. The ADOT study concluded that the major noise effects associated with the proposed SR195

would be in areas outside the 5-mile zone and that for areas adjacent to the proposed SR195 within the 5-mile zone, noise effects would not be substantial or require any noise abatement measures.

Environmental Consequences

Alternative A

Under Alternative A, no additional restrictions would be placed on motorized recreation users. Therefore, noise resulting from OHV use and noise from the Yuma Auxiliary Field likely would affect the feeling of solitude and natural ambience for those users seeking immersion in the natural, desert environment.

The adverse effects of noise resulting from new developments and increased vehicle use of new roads would be greater than under Alternative B but less than under Alternatives C and D because Alternatives C and D provide for construction of more secondary roads. The effects of noise from secondary roads likely would affect the feeling of solitude and natural ambience for those users seeking immersion in the natural, desert environment.

The effects of noise from Rolle Airfield and Yuma Auxiliary Field would be the same under all alternatives.

Alternative B

Noise levels would decrease under Alternative B, primarily because recreational OHV use would be eliminated and less development would be allowed.

Alternative C

The adverse effects of noise would be the greatest under Alternative C, primarily because Alternative C provides for the greatest construction of secondary roads to access campgrounds, day use facilities, and trailheads. These roads could create noise impacts within a greater portion of the study area than the other action alternatives. The construction and use of additional primary roads to access recreation, community, and commercial developments also would increase the adverse effects of noise.

Recreation, community, and commercial development would be greatest among all the alternatives, thereby creating additional noise and potentially affecting the solitude and naturalness of the area.

Alternative D

The adverse effects of noise under Alternative D would be greater than under Alternative B but less than under Alternative C. Unlike Alternative B, Alternative D

provides for construction and use of secondary roads to access campgrounds, day use facilities, and trailheads. Construction and maintenance of primary roads would be the same as under Alternative B.

Limited recreation, community, and commercial development also would create additional noise, potentially affecting the solitude and naturalness of the area, although eliminating recreational OHV use may mitigate some adverse effects of noise caused by development.

Cumulative Impacts

Increased recreation, community and commercial development, as well as other development (such as the proposed SR195 and new commercial port-of-entry), and the associated increased use of secondary roads may have a cumulative adverse effect on noise within the entire study area.

Mitigation

No mitigation has been identified.

Residual Impacts

No residual impacts have been identified.

TOPOGRAPHY

The topography of the 5-mile zone is relatively flat, sloping gently from an altitude of approximately 135 feet above sea level on the far western boundary to about 275 feet above sea level at the far northeastern corner. However, most of the 5-mile zone is about 150 to 200 feet above sea level and is punctuated by numerous small basins, particularly in the eastern half (U.S. Geological Survey, 1965a, 1965b, 1965c, 1990a, 1990b). The major features include Yuma Mesa to the east, the Yuma Valley to the north, and the Colorado River to the west.

The Yuma Mesa consists of a gently rolling, elevated terrace transition between the Yuma Valley and the Upper Mesa and Gila Mountains to the east. Elevations on Yuma Mesa range from 125 feet near San Luis to 200 feet near Yuma. The Gila Mountains range in elevation from about 600 feet in the outwash area adjacent to the Upper Mesa to about 2700 feet along the crest of the range.

Yuma Valley is primarily a flat flood plain located along the east bank of the Colorado River. The area has been extensively developed for irrigated agriculture

and is interspersed with irrigation canals, laterals, and drainage channels. The Yuma Valley slopes gently from approximately 75 feet above mean sea level at the Southerly International Boundary (SIB), to about 125 feet above mean sea level near Yuma.

GEOLOGY

The 5-mile zone lies in the Basin and Range geologic province, which is characterized by numerous mountain ranges that rise steeply from large, plain-like valleys or basins. The mountainous regions consist primarily of igneous, metamorphic, and sedimentary rocks. Within the valley or basin regions, deposits of gravels, sands, silts, clays, marl, gypsum, and salt predominate (Hendricks, 1985). The 5-mile zone is wholly contained within one of those broad valleys or basins. **Map V-1** shows the geology of the 5-mile zone.

The Gulf of Mexico formed during the Triassic epoch and Mesozoic era, about 200 million years ago. Much later, within the last million years (during the Pleistocene epoch), alpine glaciers covered the high mountains of Colorado, Wyoming, and Utah. When these glaciers melted, large amounts of sediments were deposited along the Colorado River, filling the upper end of the Gulf of Mexico and forming the current land forms.

The existing mesas and river terraces are remnants of an extensive former valley and delta plain of the Colorado and Gila Rivers. Yuma Mesa represents the principal river terrace in the area. The dominant materials of the terrace are fluvial gravel, sand, and silt that are overlain in places by windblown deposits.

SOILS

Affected Environment

The soils of the 5-mile zone can be very productive under irrigation because of the year-long growing season. Alfalfa yields can be up to 9 tons per acre, and cotton yields up to 1,900 pounds per acre on the lower terraces. Soils on the upper terrace have lower yields and require more intensive management because of the higher erosion hazard. Because of the very low rainfall, non-irrigated range yields are low, averaging about 500 pounds per acre. The following paragraphs describe the soils on the upper and lower terraces. Most of the 5-mile zone soils are on the upper terrace. **Map V-2** shows the soil associations of the 5-mile zone.

The soils of the upper terrace, or Yuma Mesa, are comprised of Rositas and Superstition soil series. These are deep, level to undulating, somewhat excessively drained, sandy soils on old terraces, alluvial fans, and sand dunes. The Rositas sands formed in mixed sandy, windblown material with slopes of 0 to 20 percent. The Superstition sands formed in mixed, sandy alluvium with slopes of 0 to 3 percent. These soils have slight limitations for most kinds of community development, severe limitations for recreation

5-Mile Zone
Protective and Regulatory Pumping Unit
Geology

Colorado River
West Main Canal
Central Canal
East Main Canal
Avenue J
Avenue I
Avenue H
Avenue F
Avenue E
Avenue D
Avenue C
Avenue B
Avenue A
Avenue 1E
Avenue 2E
Avenue 3E
Co 21th Street
Co 23rd Street
Co 24th Street
Juan Sanchez Blvd
36
31
1
6
R 25 W
R 24 W
R 23 W
R 22 W
T 10 S
T 11 S
T 12 S
Barry M. Goldwater Range
Main Outlet Drain Extension
Southerly International Boundary (SIB)

N

0 1 2 3 4 5 Miles

Legend

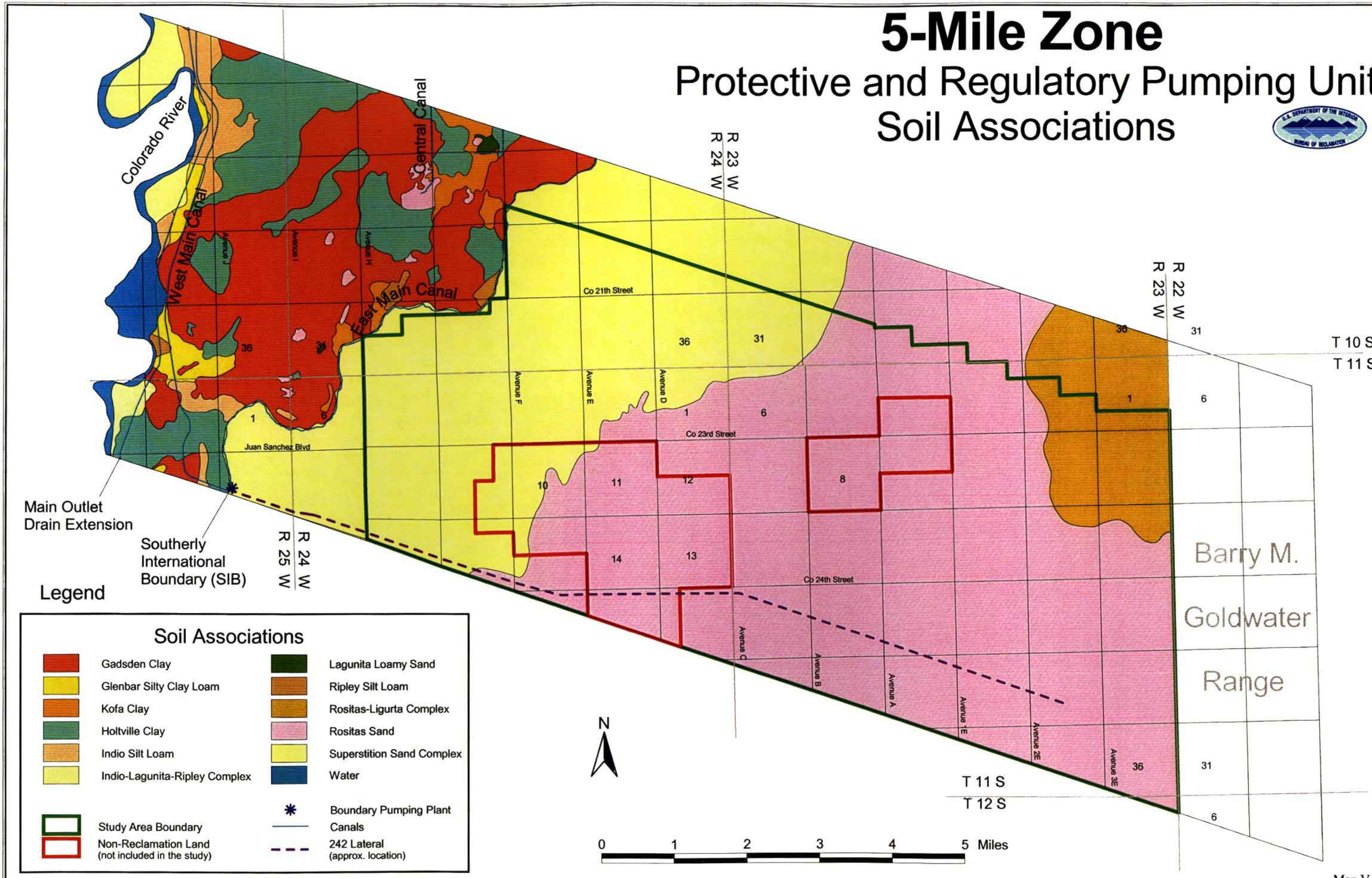
Geology

- Quaternary - Older Alluvium
- Quaternary - Young Alluvium
- Boundary Pumping Plant
- Colorado River
- Canals
- 242 Lateral (approx. location)
- Study Area Boundary
- Non-Reclamation Land (not included in the study)

5-Mile Zone

Protective and Regulatory Pumping Unit

Soil Associations



Legend

Soil Associations

- Gadsden Clay
- Glenbar Silty Clay Loam
- Kofa Clay
- Holtville Clay
- Indio Silt Loam
- Indio-Lagunita-Ripley Complex
- Lagunita Loamy Sand
- Ripley Silt Loam
- Rositas-Ligurta Complex
- Rositas Sand
- Superstition Sand Complex
- Water

- Boundary Pumping Plant
- Canals
- 242 Lateral (approx. location)
- Study Area Boundary
- Non-Reclamation Land (not included in the study)

development, poor to very poor potential for wildlife habitat, and a high wind erosion hazard. They are used for growing irrigated hay, cotton, grain, and citrus crops.

The soils of the lower terraces and flood plain are comprised mainly of Holtville, Gadsden, and Kofa soil series. These are deep, nearly level, well drained, clayey soils. They are used for growing irrigated cotton, hay, small grains, and vegetables. They have limited use for sanitary facilities and community development because of slow permeability and high shrink-swell potential of their clay layers. They have moderate to severe limitations for recreational development.

Environmental Consequences

Alternative A

Under Alternative A, the Border Patrol=s increased security zone, new drag roads, and surveillance towers will likely increase the potential for wind erosion of soils. A new utility corridor along 23rd Street and new roads and highways also will increase wind erosion potential.

Alternative B

The effects of Alternative B would be the same as for Alternative A, except that eliminating recreational OHV use would decrease wind erosion in denuded areas.

Alternative C

The effects of Alternative C would be the same as for Alternative A. In addition, protection would need to be provided to prevent erosion of soil during construction of campgrounds, day use facilities, and trails. Allowing recreational OHV use in certain areas would increase wind erosion of soil.

Alternative D

The effects of Alternative D would be the same as for Alternative C, except that eliminating recreational OHV use would decrease wind erosion of soil in denuded areas.

Cumulative Impacts

The Border Patrol's increased security zone and any new drag roads will increase wind erosion, which would be very difficult to mitigate or control and will cause some long-term environmental damage. Construction of new surveillance towers will require wind erosion control during construction, but no long-term impacts should occur. Utility corridors and new highways and roads will require wind erosion control during construction and protection of the borrow areas and paths after construction.